NI 6711/6713/DAQCard-6715 Specifications

このドキュメントの日本語版については、ni.com/manuals を参照してください。
(For a Japanese language version, go to ni.com/manuals.)

This document lists the specifications for the NI 6711/6713 and NI DAQCard-6715 analog output devices. The following specifications are typical at 25 °C unless otherwise noted.

Note With NI-DAQmx, National Instruments has revised its terminal names so they are easier to understand and more consistent among NI hardware and software products. The revised terminal names used in this document are usually similar to the names they replace. For a complete list of Traditional NI-DAQ (Legacy) terminal names and their NI-DAQmx equivalents, refer to the *Terminal Name Equivalents* section of Chapter 2, *I/O Connector*, of the *Analog Output Series User Manual*.

Analog Output

Output Characteristics

Number of channels

NI 6711 ..... 4 voltage outputs

NI 6713/DAQCard-6715 ..... 8 voltage outputs

Resolution ..... 12 bits, 1 in 4,096

Max update rate

Number of Channels	Max Update Rate (NI 6711/6713)		Max Update Rate (NI DAQCard-6715)	
	Using Local FIFO (kS/s)*	Using Host PC Memory (kS/s)†	Using Local FIFO (kS/s)	Using Host PC Memory (kS/s)‡
1	1,000	1,000	1,000	833
2	1,000	1,000	850	417
3	1,000	1,000	750	282
4	1,000	1,000	650	211
5	1,000	1,000	600	169
6	952	1,000	550	141

Number of Channels	Max Update Rate (NI 6711/6713)		Max Update Rate (NI DAQCard-6715)	
	Using Local FIFO (kS/s)*	Using Host PC Memory (kS/s)†	Using Local FIFO (kS/s)	Using Host PC Memory (kS/s)‡
7	833	869	510	121
8	740	769	480	105

* These numbers apply to continuous waveform generation, which allows for the time it takes to reset the FIFO to the beginning when cycling through it. This additional time, about 200 ns, is not incurred when using host PC memory for waveform generation. Max update rate in FIFO mode does not change regardless of the number of devices in the system.

† These results were measured using a PCI-6711/6713 device with a 90 MHz Pentium machine. These numbers may change when using more devices or when other CPU or bus activity occurs.

‡ These results were measured using a DAQCard-6715 with a 266 MHz Pentium II machine. These numbers may change when using more devices or when other CPU or bus activity occurs.

Type of DAC

NI 6711/6713 ..... Double-buffered, multiplying

NI DAQCard-6715 ..... Serial, multiplying

FIFO buffer size

NI 6711/DAQCard-6715 ..... 8,192 samples

NI 6713 ..... 16,384 samples

DMA channels
(NI 6711/6713 only) 3

Data transfers

NI 6711/6713 ..... DMA, interrupts, programmed I/O

NI DAQCard-6715 ..... Interrupts, programmed I/O

DMA modes
(NI 6711/6713 only) ..... Scatter-gather

Accuracy Information

Nominal Range at Full Scale (V)	Absolute Accuracy				
	% of Reading			Offset (mV)	Temp Drift (%/°C)
	24 Hours	90 Days	1 Year		
±10	0.0177%	0.0197%	0.0219%	±5.933	0.0005%

Absolute accuracy = (% of Reading × Voltage) + Offset + (Temp Drift × Voltage)

Note: Temp drift applies only if ambient is greater than ±10 °C of previous external calibration.

Transfer Characteristics

Relative accuracy (INL)

After calibration ..... ±0.3 LSB typ, ±0.5 LSB max

Before calibration ..... ±4.0 LSB max

DNL

After calibration ..... ±0.3 LSB typ, ±1.0 LSB max

Before calibration ..... ±3.0 LSB max

Monotonicity ..... 12 bits guaranteed after calibration

Offset error

After calibration ..... ±1.0 mV typ, ±5.9 mV max

Before calibration ..... ±200 mV max

Gain error (relative to internal reference)

After calibration ..... ±0.01% of output max

Before calibration ..... ±0.5% of output max

Gain error (relative to external reference) ..... +0.0 to +0.67% of output max, not adjustable at >4 V

Voltage Output

Ranges ..... ±10 V, ±EXT REF

Output coupling ..... DC

Output impedance ..... 0.1 Ω max

Current drive ..... ±5 mA max

Output stability ..... Any passive load, up to 1,500 pF

Protection ..... Short-circuit to ground

Power-on state ..... 0 V (±200 mV)

External Reference Input

Range ..... ±11 V

Overvoltage protection ..... ±25 V powered on, ±15 V powered off

Input impedance ..... 10 kΩ

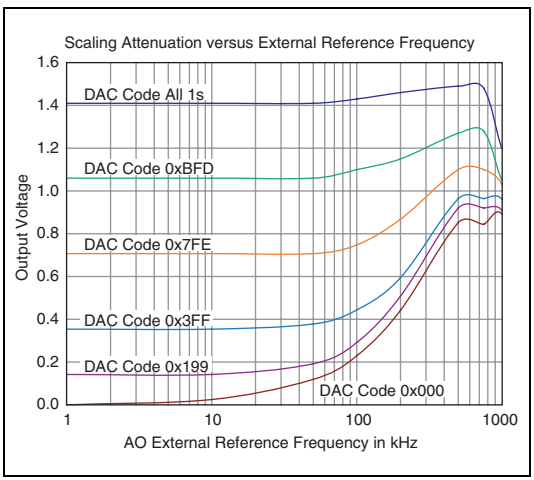

Figure 1. NI 6711/6713 Scaling Attenuation versus External Reference Frequency

Note **(NI 6711/6713 Only)** External reference input is always a 1.414 V peak-to-peak sine wave.

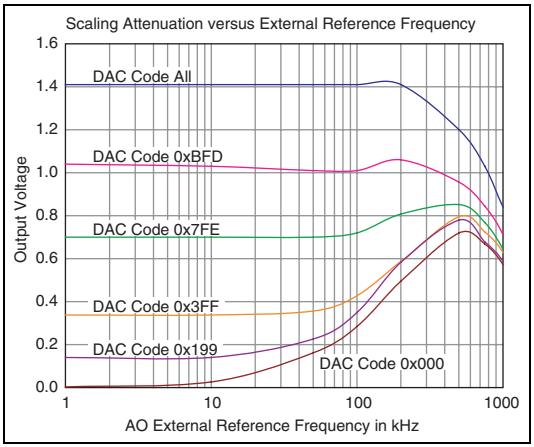

Figure 2. NI DAQCard-6715 Scaling Attenuation versus External Reference Frequency

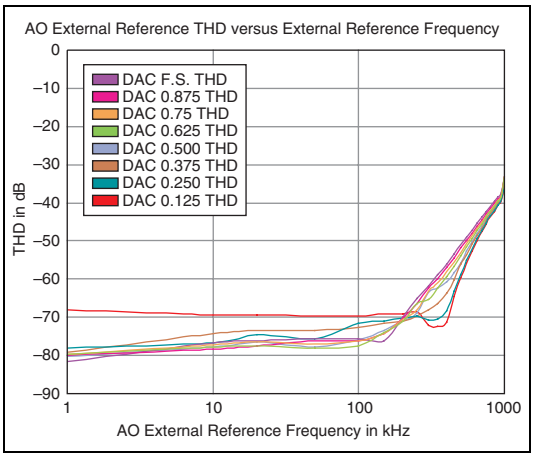

Figure 3. NI 6711/6713 AO External Reference THD versus External Reference Frequency

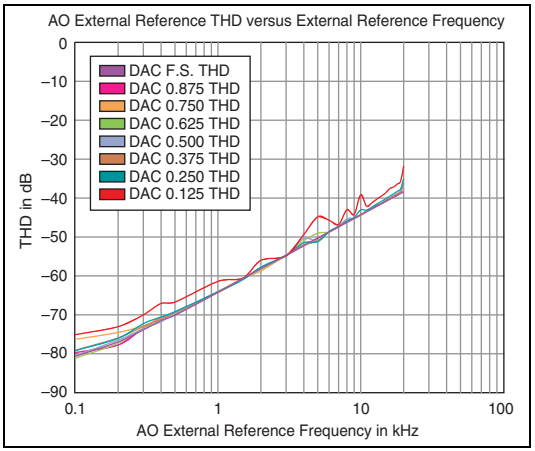

Figure 4. NI DAQCard-6715 AO External Reference THD versus External Reference Frequency

Dynamic Characteristics

Slew rate ..... 20 V/µs

Noise

NI 6711/6713 ..... 200 V_{rms}, DC to 1 MHz

NI DAQCard-6715 ..... 400 µV_{rms}, DC to 1 MHz

Glitch energy (at mid-scale transition, NI DAQCard-6715 only)

Magnitude

Reglitching disabled ..... ±20 mV

Reglitching enabled ..... ±4 mV

Duration ..... 1.5 µs

Channel crosstalk

NI 6711/6713 ..... –70 dB with SH68-68-EP cable (generating a 10 V, 10 point sinusoidal at 100 kHz on the reference channel)

NI DAQCard-6715 ..... –60 dB (generating a 10 V, 10 point sinusoidal at 100 kHz on the reference channel)

Settling time ..... 3.0 µs to ±0.5 LSB accuracy

Total harmonic distortion ..... –80 dB typ (generating a 10 V, 1,000 point, 750 Hz sine wave, summing 9 harmonics)

Stability

Offset temperature coefficient ..... ±50 µV/°C

Gain temperature coefficient

Internal reference ..... ±25 ppm/°C

External reference ..... ±25 ppm/°C

Onboard calibration reference

Level ..... 5.000 V (±2.5 mV) (actual value stored in EEPROM)

Temperature coefficient ..... ±5.0 ppm/°C max

Long-term stability ..... ±15 ppm/$\sqrt{1{,}000\ h}$

Digital I/O

Number of channels ..... 8 input/output

Compatibility ..... TTL/CMOS

Digital logic levels

Level	Min	Max
Input low voltage	0 V	0.8 V
Input high voltage	2.0 V	5.0 V
Input low current (V_{in} = 0 V)	—	–320 µA
Input high current (V_{in} = 5 V)	—	10 µA
Output low voltage (I_{OL} = 24 mA)	—	0.4 V
Output high voltage (I_{OH} = –13 mA)	4.35 V	—

Power-on state ..... Input (high-impedance)

Data transfers ..... Programmed I/O

Timing I/O

Number of channels ..... 2 up/down counter/timers, 1 frequency scaler

Resolution

Counter/timers ..... 24 bits

Frequency scaler ..... 4 bits

Compatibility ..... TTL/CMOS

Base clocks available

Counter/timers ..... 20 MHz, 100 kHz

Frequency scaler ..... 10 MHz, 100 kHz

Base clock accuracy ..... ±0.01% over operating temperature

Max source frequency ..... 20 MHz

External source selections
(NI DAQCard-6715 only) ..... PFI <0..9>, software-selectable

External gate selections
(NI DAQCard-6715 only) ..... PFI <0..9>, software-selectable

Min source pulse duration ..... 10 ns, edge-detect mode

Min gate pulse duration ..... 10 ns, edge-detect mode

Data transfers
- NI 6711/6713 ..... DMA, interrupts, programmed I/O
- NI DAQCard-6715 ..... Interrupts, programmed I/O

DMA modes
(NI 6711/6713 only) ..... Scatter-gather

Triggers

Digital Trigger

Purpose
- Analog output ..... Start trigger, gate, clock
- Counter/timers ..... Source, gate

Source ..... PFI <0..9>

Slope (NI DAQCard-6715 only) ..... Positive or negative; software-selectable

Compatibility ..... TTL

Response ..... Rising or falling edge

Pulse width ..... 10 ns min

RTSI Bus (PCI-6711/6713 Only)

Trigger lines <0..6> 7

RTSI clock 1

PXI Trigger Bus (PXI-6711/6713 Only)

Trigger lines <0..5> 6

Star trigger 1

Clock 1

Bus Interface

NI PCI-6711/6713 ..... 5 V PCI master, slave

NI PXI-6711/6713 ..... PXI/CompactPCI master, slave

NI DAQCard-6715 ..... 16-bit PC Card (PCMCIA)

Power Requirement

NI 6711
- +5 VDC (±5%) ..... 0.80 A typ, 1.0 A max
- Power available at I/O connector ..... +4.65 to +5.25 VDC at 1 A

NI 6713
- +5 VDC (±5%) ..... 1.25 A typ, 1.5 A max
- Power available at I/O connector ..... +4.65 to +5.25 VDC at 1 A

NI DAQCard-6715
- +5 VDC (±5%) ..... 160 mA typ, 250 mA max plus any current used from the I/O connector

Physical

Dimensions (not including connectors)
- NI PCI-6711/6713 ..... 17.5 × 10.7 cm (6.87 × 4.2 in.)
- NI PXI-6711/6713 ..... 16 × 10 cm (6.3 × 3.9 in.)
- NI DAQCard-6715 ..... Type II PC Card

I/O connector
- NI 6711/6713 ..... 68-pin male SCSI-II type
- NI DAQCard-6715 ..... 68-pin female Honda connector

Maximum Working Voltage

Maximum working voltage refers to the signal voltage plus the common-mode voltage.

Channel-to-earth ..... ±11 V, Installation Category I

Channel-to-channel ..... ±22 V, Installation Category I

Environmental

The NI 6711/6713/DAQCard-6715 is intended for indoor use only.

Operating temperature ..... 0 to 50 °C

Storage temperature ..... –20 to 70 °C

Humidity ..... 5 to 90% RH, noncondensing

Maximum altitude .....2,000 meters

Pollution Degree.....2

Note Clean the device with a soft, non-metallic brush. Make sure that the device is completely dry and free from contaminants before returning it to service.

Safety

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label, or visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

- EN 61326 EMC requirements; Minimum Immunity
- EN 55011 Emissions; Group 1, Class A
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A

Note For EMC compliance, operate this device with shielded cabling.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at `ni.com/environment`. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of their life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit `ni.com/environment/weee.htm`.

电子信息产品污染控制管理办法 （中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

Device Pinouts

AO GND 34 68 NC
NC 33 67 AO GND
AO GND 32 66 AO GND
AO GND 31 65 NC
NC 30 64 AO GND
AO GND 29 63 AO GND
NC 28 62 NC
AO GND 27 61 AO GND
AO GND 26 60 NC
AO 3 25 59 AO GND
AO GND 24 58 AO GND
AO GND 23 57 AO 2
AO 0 22 56 AO GND
AO 1 21 55 AO GND
AO EXT REF 20 54 AO GND
P0.4 19 53 D GND
D GND 18 52 P0.0
P0.1 17 51 P0.5
P0.6 16 50 D GND
D GND 15 49 P0.2
+5 V 14 48 P0.7
D GND 13 47 P0.3
D GND 12 46 NC
PFI 0 11 45 EXT STROBE
PFI 1 10 44 D GND
D GND 9 43 PFI 2
+5 V 8 42 PFI 3/CTR 1 SOURCE
D GND 7 41 PFI 4/CTR 1 GATE
PFI 5/AO SAMP CLK 6 40 CTR 1 OUT
PFI 6/AO START TRIG 5 39 D GND
D GND 4 38 PFI 7
PFI 9/CTR 0 GATE 3 37 PFI 8/CTR 0 SOURCE
CTR 0 OUT 2 36 D GND
FREQ OUT 1 35 D GND
NC = No Connect

Figure 5. NI 6711 68-Pin AO I/O Connector Pin Assignments

AO GND 34 68 NC
NC 33 67 AO GND
AO GND 32 66 AO GND
AO GND 31 65 AO 7
AO 6 30 64 AO GND
AO GND 29 63 AO GND
AO 5 28 62 NC
AO GND 27 61 AO GND
AO GND 26 60 AO 4
AO 3 25 59 AO GND
AO GND 24 58 AO GND
AO GND 23 57 AO 2
AO 0 22 56 AO GND
AO 1 21 55 AO GND
AO EXT REF 20 54 AO GND
P0.4 19 53 D GND
D GND 18 52 P0.0
P0.1 17 51 P0.5
P0.6 16 50 D GND
D GND 15 49 P0.2
+5 V 14 48 P0.7
D GND 13 47 P0.3
D GND 12 46 NC
PFI 0 11 45 EXT STROBE
PFI 1 10 44 D GND
D GND 9 43 PFI 2
+5 V 8 42 PFI 3/CTR 1 SOURCE
D GND 7 41 PFI 4/CTR 1 GATE
PFI 5/AO SAMP CLK 6 40 CTR 1 OUT
PFI 6/AO START TRIG 5 39 D GND
D GND 4 38 PFI 7
PFI 9/CTR 0 GATE 3 37 PFI 8/CTR 0 SOURCE
CTR 0 OUT 2 36 D GND
FREQ OUT 1 35 D GND
NC = No Connect

Figure 6. NI 6713/DAQCard-6715 68-Pin AO I/O Connector Pin Assignments

National Instruments, NI, ni.com, and LabVIEW are trademarks of National Instruments Corporation. Refer to the *Terms of Use* section on `ni.com/legal` for more information about National Instruments trademarks. Other product and company names mentioned herein are trademarks or trade names of their respective companies. For patents covering National Instruments products, refer to the appropriate location: **Help»Patents** in your software, the `patents.txt` file on your CD, or `ni.com/patents`.

© 2004–2007 National Instruments Corporation. All rights reserved.